

## BUTTONLESS COMMUNICATION DEVICE WITH TOUCHSCREEN DISPLAY

### TECHNICAL FIELD

[0001] The present invention relates generally to communications. More particularly, the present invention relates to telephone handsets.

### BACKGROUND OF THE INVENTION

[0002] The functions of personal digital assistants and cellular telephones are merging. Devices are emerging that not only can hold addresses and phone numbers but can also communicate over the Internet through a wireless connection. This gives the user the ability to send e-mail, download stock quotes, look-up directions for travel as well as make telephone calls.

[0003] Many cellular telephone manufacturers enable the personal digital assistant and cellular telephone capability by providing a larger display on the telephone. The larger display is able to show multiple lines of information as well as icons for accessing the personal digital assistant functions of the device.

[0004] In order to keep the telephone small and still provide a reasonably large display for information, the size of the keypads for entering data has been reduced substantially. Individuals with large fingers or users that try to input data while moving may have trouble depressing the small keys properly. There is a resulting unforeseen need for a small communications device that merges the functions of a personal digital assistant and a telephone, cellular or otherwise, while still providing a display that is large enough for practical information viewing and a keypad that is easy to use.

### SUMMARY OF THE INVENTION

[0005] The present invention encompasses a communications device that transmits and receives communication signals. In the preferred embodiment, the communications device is a wireless radiotelephone for operation in a cellular system.

[0006] The radiotelephone comprises a transmitter that converts electrical representations of sound signals into communication signals for transmission over a medium. A receiver receives communication signals that are converted into received electrical representations of sound signals.

[0007] A touch-screen display is comprised of icons that represent numbers. The icons are used to enter a number in response to a contact, on the display, over a particular icon to be entered. A controller controls the transmitter, the receiver, and the touch-screen display. The controller controls the operation of the communications device and comprises an apparatus that generates the icons representing numbers for display on the touch-screen display. The controller also comprises an apparatus that generates an accumulated telephone number in response to the particular icons contacted on the touch-screen display.

### BRIEF DESCRIPTION OF THE DRAWINGS

[0008] FIG. 1 shows a typical cellular telephone with keypad.

[0009] FIG. 2 shows a buttonless, wireless communication device of the present invention in a telephone mode.

[0010] FIG. 3 shows the mode selection icons of the present invention.

[0011] FIG. 4 shows a wireless headset coupled to the communication device of the present invention.

[0012] FIG. 5 shows a block diagram of the communication device of the present invention.

[0013] FIG. 6 shows a flowchart of a communication device process of the present invention.

[0014] FIG. 7 shows a flowchart of a received call process for the communication device of the present invention.

[0015] FIG. 8 shows a tactile response display screen of the present invention.

[0016] FIG. 9 shows a block diagram of the communications device in accordance with the embodiment of FIG. 4.

### DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0017] The communication device of the present invention provides a telephone with a full length, tactile response, touchscreen display. Instead of portions of the telephone being taken up by a fixed keypad, the touchscreen display can display a keypad while in the telephone dialing mode but then replace the keypad with extra display space for data. The display also features dynamically raised keys and buttons in response to what is being displayed.

[0018] FIG. 1 illustrates a typical radiotelephone using a fixed keypad (101). The small display (105) is very limited in the amount of information that it can display. The keypad (101) cannot be moved or removed to enlarge the display in any way.

[0019] FIG. 2 illustrates the buttonless communication device of the present invention. In the preferred embodiment, this communication device is a wireless radiotelephone for use in a cellular system. Alternate embodiments use other types of telephones such as cordless telephones, for use in the home, that are coupled to the public switched telephone system. The cellular radiotelephone of the present invention is not constrained to any one air-interface standard. It works equally well with code division multiple access (CDMA), global system for mobile communication (GSM), time division multiple access (TDMA), or even advanced mobile phone system (AMPS).

[0020] The telephone illustrated in FIG. 2 is comprised of a large touchscreen display (201). FIG. 2 illustrates the present invention in the telephone mode. In this mode, the device displays number icons (205) or other informational symbols (not shown) which form and are used as a telephone keypad for entering telephone numbers. The display also displays a "SEND" key (207) and an "END" key (210) (for purposes of this disclosure, the term "key" does not refer to a physical button or switch but instead refers to an area of the display screen which when contacted or touched causes the generation of a signal to the phone that is representative